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INTERNATIONAL CENTRE FOR ENVIRONMENTAL AND INDUSTRIAL TOXICOLOGY (ICEIT)

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"UNEP Centre of Excellence for Environmental and Industrial Toxicology".

PESTICIDE EXPOSURE PATHWAYS FOR CHILDREN OF AGRICULTURAL FAMILIES

Children of farmers and agricultural field workers are likely to have a high potential for pesticide exposure, even if they are not involved in farm activities related to exposure. Pesticide exposure could occur from a number of sources such as contaminated soil, dust, work clothing, water, and food, or through drift, the deposition of a pesticide off target. In many agricultural communities, residential home sites are close to or surrounded by fields or orchards. Pesticides can be tracked into the home on shoes or by pets and become part of a household dust "reservoir". Pesticide residues in indoor environments are not subject to degradative environmental processes such as sun, rain, and soil microbial activity, and may thus persist longer in the house than in outdoor soil.

Household dust and yard soil are considered significant sources of exposure to pesticide residues and other toxicants for small children. Young children spend a large portion of their time on the floor or ground and can easily come in direct contact with soil or dust by putting hands and objects in their mouths frequently, and thereby ingesting soil or dust. Studies using tracer elements to quantify soil ingestion have estimated that children in the United States can ingest from 10 to 1300 mg of soil/day; in children with a pica history, the level can reach 5000 mg/day. Investigators estimated the potential health risks to children for the soil and dust pathway to be 12 times that of adults.

U.S. Government reporting of pesticide poisoning cases is one indicator of the hazards or risks associated with pesticide use on the farm or in the home. In 1991, 39% of pesticide incidents reported to all agencies in Washington State were agriculturally related. One case that demonstrates the potentially serious nature of post-application exposures involved a 20-month-old child who developed acute poisoning from ingesting ethyl parathion-contaminated soil. However, present reporting data do not allow

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PESTICIDE EXPOSURE PATHWAYS FOR CHILDREN OF AGRICULTURAL FAMILIES

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assessment of the overall prevalence or severity of chronic exposures to pesticides for children in agricultural settings. Reliance on such statistics is limited by at least three factors: 1) reported cases generally involve only acute intoxications (subacute or chronic effects are likely to remain unreported), 2) even acute cases may not be recognized or reported consistently by physicians as pesticide related, and 3) cases tend to provide little information for exposure mitigation. Thus, properly focused environmental sampling represents a more reliable and preventive approach for investigating public health concerns related to children's exposure to pesticides in agricultural and residential settings.

Carefully designed longitudinal or interventional studies are needed to adequately identify risk factors associated with the introduction of contaminants into the home. Biological monitoring based on urine sample collection may serve as an appropriate and noninvasive means of sampling exposure among small children.

Proximity to spray areas appears to have been the predominant, though not the only, factor responsible for elevated pesticide concentrations in household dust in this study. A number of variables still need to be assessed before it is possible to accurately estimate children's exposure from the dust/soil pathway, such as track-in, children's activity patterns, surface-to-skin contact/transfer rates for pesticides, dust/soil ingestion rates, and percutaneous uptake.

Several strategies are available to reduce the risk potential of pesticide contamination in the home. A high percentage of participants in this study reported the use of full protective equipment while spraying and indicated that they did not bring this equipment into the home. These prudent work practices should be encouraged. Furthermore, programs designed to assist families with preventing or reducing indoor contaminants have been implemented in urban areas in the United States, especially for lead, and can be implemented in rural areas as well. Recommendations to reduce residential contaminants include improved home hygiene and personal hygiene measures, such as removal of shoes at the door, use of door mats, improved vacuuming techniques, and frequent washing of children's hands. The use of greater precautions when applying pesticides close to homes and a change in the practice of situating homes within orchard spray regions might also be considered. Finally, a change at the policy level to reduce the use of pesticides in the home and in surrounding agricultural areas would represent a strategy of primary prevention of pesticide exposure. The Environmental Protection Agency and the U.S. Department of Agriculture have recently proposed a Pesticide Use Reduction Initiative which has as one of its goals the establishment of integrated pest management on 75% of active agricultural lands in 5 years. Policies such as this are very likely to affect pesticide contamination in the home, thereby reducing potential exposure to children and other family members.

Source: Abridged from "Pesticides in Household Dust and Soil: Exposure Pathways for Children of Agricultural Families", Environmental Health Perspectives, Vol.103, No.12, December 1995

Biomarkers and Occupational Health

A seminal collection of papers published in 1995 under the title "Biomarkers and Occupational Health"① focuses on the development of new uses of biomarkers in monitoring and prevention of chemically induced illness. The use of biomarkers can reveal the unknown sequence of events linking exposure to diagnosable cases of illness or death and thus act as a catalyst in conventional epidemiological studies. Moreover, it is quite possible that new biomarker technology could transform current practice in cancer epidemiology. The capability to sequence the genes that are part of the molecular pathological pathway for tumours in individuals could well provide a basis for a novel categorisation of disease outcomes with probable etiologic significance.

Another future possibility is technology to measure the cellular frequency of known types of mutations along known cancer pathways in otherwise normal tissues. This would change the unit of analysis from the whole person to the individual cells in different tissues. Thus, autopsies on a small number of people with well-characterized exposures could yield more useful dose-response information than conventional diachronic cohort studies of groups of several thousands.

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① Biomarkers and Occupational Health. Progress and Perspectives. MORTIMER L. MENDELSOHN, JOHN, P. PEETERS, and MARY JANET NORMANDY, Eds. Joseph Henry Press (National Academy Press), Washington, DC, 1995.

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY (IPCS)

The IPCS INTOX Package is now available commercially on a subscription basis. This Package has been produced by the IPCS INTOX Project. This Project was established in 1988 to develop a poison information package, particularly to assist developing countries in setting up their poison information centres. The Project was initiated as a joint undertaking of the International Programme on Chemical Safety (IPCS), the Canadian Centre for Occupational Health and Safety (CCOHS) and the Centre de Toxicologie du Quebec (CTQ) with the financial assistance of the International Development Research Centre (IDRC) of Canada and Member States of the World Health Organization (WHO).

Over one hundred experts have participated in the development of the Package which is designed to provide sophisticated information management at poison centres. Through international consensus, harmonised data collection formats using a controlled vocabulary have been established as an integral aspect of the Package. This provides users of the Package with a basis for international sharing and comparison of data. The information management software, known as the IPCS INTOX System, is currently available in English; with French, Portuguese and Spanish versions of the System being issued in early 1996.

This software system contains five classification schemes:

(i) a classification of chemical and pharmaceutical substances

(ii) a classification of poisonous plants

(iii) a classification of animals

(iv) a use or function classification

(v) a classification of clinical features of poisoning

These classification schemes will be enhanced as a result of further experience of the use of the IPCS INTOX Package worldwide, and any modifications will be included in updates of the software to be issued regularly to subscribers. As the needs of poison centres for further information management capabilities evolve, extensions will be made to the software system and supplementary software packages will be developed, for example for recording analytical data and for the follow-up of chemical incidents.

Accompanying the IPCS INTOX System as part of the Package is an IPCS INTOX CD-ROM, issued on a biannual basis, which contains a database on substances commonly implicated in cases of poisoning worldwide. Whilst the CD-ROM contains a range of IPCS publications and data from CCOHS, the majority of information on diagnosis and treatment of poisoning is contained in a series of Poison Information Monographs (PIMs). These monographs are intended to provide up-to-date information to assist a poison centre in responding to inquiries about exposures and suspected poisoning. In the first version of the CD-ROM there are 83 PIMs dealing with chemical substances, pharmaceuticals, poisonous plants and venomous animals, plus over 400 additional publications covering aspects of the toxicological effects of a further 500 substances. A further one hundred PIMs are in preparation and are expected to be available on the CD-ROM by the third issue at the end of 1996. Although a number of PIMs do not yet contain analytical sections, these sections are expected to be completed in time for the third issue of the CD-ROM.

The Package is accompanied by a detailed user manual containing a training tutorial. Regional, sub-regional and national training workshops can be organised on a cost recovery basis. Being the product of a dynamic Project involving more than one hundred experts from different disciplines from all over the world, the information contained in the Package is revised and expanded as required and is kept up-to-date. Participants in the Project provide feedback and help identify new priorities for information required in countries to prevent and respond to poisoning. New versions of the software and updates of the CD-ROM are issued to subscribers regularly.

The Package has been developed as a result of financial support from a number of donors, particularly the IDRC of Canada and some governments providing domestic funds to the IPCS, as well as through the hard work of experts participating in the Project. It has been agreed by consensus among Project participants that the maintenance, updating, enhancement and user support of the Package will be supported by a users annual subscription. This has been set at US$1,000 per annum for the software system and US$500 per annum for the CD-ROM for single PC use, with a graduated subscription fee for network versions, depending on the number of terminals.

During the first year of issue there is an introductory subscription rate for the Package (both the software system and

CD-ROM) of US$1,000. However, a special concessionary rate of US$500 for the whole Package has been set for those participants in the Project who have contributed to the development of the Package. For those who require only the CD-ROM, the price remains at US$500, i.e. there is no special introductory price for the CD-ROM alone.

While every attempt has been made to ensure the accuracy of information in the Package, the Project requests users to provide feedback, in particular on enhancements and additions which would be desirable for future issues. Comments should be sent to:

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PESTICIDES IN BABY FOOD

The report of a U.S. study of pesticides in brand-name baby foods by the Environmental Working group and the National Campaign for Pesticide Policy Reform published in July 1995① detected sixteen pesticides in eight brand-name baby foods. All levels of pesticides found were, however, below U.S. Federal standards. While these standards are set with safety considerations for infants, the actual risk assessments are based on an average adult. The report's findings are consistent with the conclusions of a five-year investigation by the National Academy of Sciences published in 1993 which suggests that federal standards may not adequately account for the special vulnerability of infants and young children to chemical substances. Moreover, these standards do not account for the total doses of pesticides that babies receive from other sources, including fresh produce, drinking water, possibly breast milk, or from the additive effects of pesticides. Physicians for a Washington-based group, Social Responsibility, believe it is time to begin phasing out the most unsafe pesticides on the market and provide the right kinds of incentives for safer biological alternatives. Meanwhile, the U.S. agricultural community believes that advances in biotechnology, coupled with improved integrated pest management strategies, are having an important impact in on reduction of pesticide use. It is claimed that within 5 to 10 years, the two biggest uses of insecticides in the United States will drop precipitously. This will be due to developments in genetically vaccinating cotton and corn plants with a gene from a disease microbe, so that when an insect eats the plant leaves, it gets sick and stops feeding.

Since pesticides will be necessary for many years to come in order for farmers to provide an adequate supply of food for the world's growing population, a major objective of future pesticide legislation must continue to be the protection of public health, especially children's health.

Source: Environmental Health Perspectives, Vol.103, No.12, December 1995

① The Environmental Working Group and the National Campaign for Pesticide Policy Reform., Washington, D.C., 1995

ENVIRONMENT ON-LINE:
A SHORT GUIDE TO INTERNET RESOURCES

The Internet provides access to substantial data archives, the U.S. Environment Protection Agency (EPA) and other government agency materials, searchable indexes of federal and state regulations, and on-line forums on a wide range of specialized environmental topics.

Internet tools range from the relatively simple electronic mail "listservs" and data transfer capabilities such as gopher and ftp (file transfer protocol) to the World Wide Web. It is with the Web that data, images, sounds, and automatic "links" to other Internet sites are available. Because Web browsers are being expanded to allow access to electronic mail, gopher, and other functions, other Internet resources are increasingly becoming available through the Web.

Hundreds of environment-related Web sites exist on the Internet. Government agencies, university departments, environmental groups, and consulting firms have established sites on the Web, and many others are rushing to do so.

EPA's Web home page is one of the more valuable sites on the Internet for the environmental professional. The site can be busy, however, which often makes data retrieval a slow process.

The main site contains data archives, software, regulations, publications, and general information for the public. Selecting "Rules, Regulations, and Legislation" leads to a searchable index of *Federal Register* notices on environmental topics. Other offerings include a manual outlining methods for measuring the toxicity of effluents, posted by the Office of Water; a summary of the EPA "Air Quality Trends" report for 1994, with information on ordering the full document; and the full

text of the EPA Science Advisory Board's dioxin reassessment draft report.

The site also has links to EPA offices, regions, and laboratories. For example, a link from the agency's Kerr Laboratory in Oklahoma leads to, among other places, a repository of downloadable DOS programs, courtesy of EPA's Center for Exposure Assessment Modeling.

Not all of EPA's data holdings, however, are currently accessible via the Web. Some can be reached only through dial-in bulletin boards operated as part of the agency's Technology Transfer Network (TTN) or through limited telnet connections to the Internet. These bulletin boards, established in 1988, have been successful in providing access to EPA models, software, data, and supporting documentation. The information is free, but often requires a long-distance call for the user.

Other Internet applications under development at EPA include long-distance collaboration with the agency's Center for Scientific Visualization. Environmental scientists with a particularly complex data set could work with staff at either of two locations – the National Environmental Supercomputing Center in Bay City, Mich., or the National Data Processing Division in Research Triangle Park, N.C. – to develop tools for displaying their data.

Many other government agencies involved in environmental research have some kind of on-line presence, if only basic program information and a list of contacts. The Department of Energy, for example, has a number of environmentally related Internet sites linked to its home page, including specific sites for epidemiologic data and pollution prevention information. The National Center for Atmospheric Research maintains an impressive archive of data and software for atmospheric scientists from sources as varied as the Defense Meteorological Satellite Program and data collected during the Kuwait oil fires.

For toxicologists, the National Library of Medicine offers the Toxicology and Environmental Health Information Program gopher. For a small fee, users can search through large databases of information on toxicology and environmental health.

Smaller government agencies offer valuable on-line information as well. The U.S. Geological Survey (USGS), for example, provides a searchable bibliography in the field of water research with more than 265,000 abstracts and citations. USGS also operates the federal government's National Geospatial Data Clearinghouse, a distributed electronic network designed to help users determine what geospatial data exist, find the data they need, evaluate the usefulness of the data for their applications, and obtain or order the data as economically as possible.

For small agencies with limited budgets, the Web has become an important way to get information out to the user community at low cost. Staff of the Agency for Toxic Substances and Disease Registry (ATSDR) in Washington, D.C., had been answering by phone or mail queries about the Hazardous Substance Release/Health Effects Database (HazDat), which the agency created in 1989 to provide data on the release of hazardous substances into the environment.

As more environmental resources become available through the Internet in the next few years, the value of "getting wired" will steadily increase and along with it the challenge of finding your way through the sea of information. The ability to keep up with the latest data or technical literature on the Internet will become a necessity.

Useful References

U.S. Environmental Protection Agency home page: *http://www.epa.gov.*

The Practicing Attorney's Home Page, environmental resources: *http://users.aimnet.com*

EPA-sponsored bulletin boards: *http://www.geopac.com/epabbs.html*

AIRS database: *http://www.epa.gov/docs/airs/airs.html*

National Environmental Information Resources Center: *http://gwis.circ.gwu.edu*

EPA Center for Scientific Visualization: *http://www.epa.gov/nesc/vislab*

U.S. Department of Energy home page: *http://www.doe.gov*

Comprehensive epidemiologic Data Resource, U.S. Department of Energy: *http://cedr.lbl.gov*

U.S. Department of Energy Pollution Prevention Information Clearinghouse: *http://146.138.5.107/epic.htm*

National Center for Atmospheric Research, Research Data Archives: *http://http.ucar.edu/Research Data.html*

National Library of Medicine Toxicology and Environmental Health Information Program: *http://gopher.nlm.nih.gov:70/11/teh*

U.S. Geological Survey WRSIC Research Abstracts Database: *http://www.uwin.siu.edu/databases/wrsic/index.html*

U.S. Geological Survey, Federal Geographic Data Committee National Geospatial Data Clearinghouse: *http://fgdc.er.usgs.gov*

Agency for Toxic Substances and Disease Registry, Hazardous Substance Release/Health Effects Database (HazDat): *http://atsdr1.atsdr.cdc.gov: 8080/atsdrhome.html*

List of state environmental agencies: *http://www.tribnet.com/environ/env stat.htm*

State of Florida Department of Environmental Protection home page: *http://www.dep.state.fl.us/index.html*

List of university environmental Web sites: *http://bigmac.civil.mtu.edu/aeep/univ.html*

University of California-Los Angeles Center for Clean Technology: *http://cct.seas.ucla.edu*

University of California-Berkeley Digital Library Project: *http//elib.cs.berkeley.edu*

Cornell University list of environmental and natural resource databases: *http://www.mannlib.cornell.edu/catalog/subject/env.html*

List of environmental listservs: *http://www.tribnet.com/environ/env list.htm#environmental*

List of Usenet newsgroups: *http://gwis.circ.gwu.edu*

(Edited from the article which appeared in Environmental Science & Technology, American Chemical Society, February 1996)

Breastfeeding and infant health

Researchers at Lund University and at the Karolinska Institute in Stockholm have discovered that breastfeeding may play yet another important role in infant health. They have isolated a substance from human milk that destroys cancer cells while leaving healthy cells unaffected.

Following up on observations made in a study on how milk affects the attachment of pathogenic bacteria to lung cells, investigators isolated the active component of milk, the protein lactalbumin. For reasons not yet understood, the cytotoxic effect was not produced by single protein molecules but by aggregates of two or more molecules, called multimeric lactalbumin (MAL). Research on other cell types demonstrated that the effect of MAL was selective: in addition to tumour cells, lymphoid and embryonic cells were also killed, while mature normal cells of lung epithelium and solid organs were left unharmed.

The researchers found that MAL destroys tumour cells by inducing the process of apoptosis, the sequences of genetically programmed steps by which cells self-destruct. Apoptosis can occur naturally at the end of a cell's life or when a cell is diseased and sacrifices itself to prevent the spread of disease. In many diseases, however, the mechanism that initiates apoptosis malfunctions because cells have inactivated the pathway for apoptosis and thus live longer than they are supposed to. This is a mechanism of cancer. The Swedish research study addresses the possibility of inducing apoptosis in these cells inspite of this inactivation, which could have good potential in the design of new antitumour agents.

Source: Environmental Health Perspectives, Vol.103, No.12, December 1995

ENVIRONMENTAL CAUSES OF ASTHMA

According to a recent report by the U.S. Centers for Disease Control, the number of people with asthma increased by 42% in the last decade. Not only is asthma becoming more prevalent, it is also becoming more severe, as evidenced by statistics gathered by the U.S. National Heart, Lung, and Blood Institute, indicating that the number of people who die of asthma increased 58% between 1979 and 1992. The incidence and mortality of asthma in the United States is, moreover, disproportionately high in ethnic minorities and those living in poverty. A possible explanation for this is that, in the lower socio-economic groups, individuals are exposed to allergens very early in life. Once sensitized, repeated exposure to these allergens leads to chronic airway inflammation and asthma.

When people with asthma encounter allergens, environmental irritants, or viral infections, a complex nexus of events leads to airway inflammation and construction. As air is forced past smaller and constricted channels, asthmatics develop an audible wheeze, shortness of breath, chest pain, and coughing. Long-term exposure to irritants can lead to permanent reductions in lung function, damage to lung tissue, severe breathing discomfort, and can also lower resistance to infection. Some 70 to 75% of asthmatics have allergic asthma, and their respiratory systems develop a very specific response to a specific allergen. Nonallergic asthmatics, on the other hand, show little sensitivity to allergens. Asthma and allergies appear to be inherited separately: most asthmatics can name at least one person in their family who has suffered from asthma or allergies. At least half of the people with asthma have allergic rhinitis, or inflammation of the nasal membranes and a third have atopic dermatitis, known as eczema.

The reported increase in asthma is not unique to the United States: it appears to be increasingly prevalent in other economically developed countries such as Britain and Australia, as well as in developing countries.

In the search for environmental causes for these alarming statistics, researchers are focusing on direct exposures to allergens indoors, where people spend a high proportion of their time. Research shows that cumulative exposure to dust mites, which live in bedding, upholstery, and carpets, causes some people to develop allergic sensitivity, including asthma and airway hyper-responsiveness. The levels of cockroach antigen generally found in suburban homes are too low to sensitize individuals, but the much higher levels found in inner-city dwellings and homes of lower socio-economic groups are sufficient to cause sensitization that appears to be associated with asthma. Other research studies have focused on ambient air quality with reference to fine particle concentrations. A recent study carried out in Seattle, Washington, showed that the PM_{10} level (number of particles less than 10 micrometers in diameter) on any particular day was a significant predictor of the number of emergency hospital visits for asthma. At 30 $\mu g/m^3$, which was the mean concentration of PM_{10} in Seattle during the period of the study, PM_{10} exposure appeared to be responsible for approximately 12% of the emergency visits for asthma. However, at present, there is no accepted toxicological basis for understanding how PM_{10} is linked with the epidemiological results. A more adequate framework is needed for understanding associations that occur with PM_{10} at concentrations as low as 30 micrograms per cubic meter. Other recent studies have focused on the apparent link between ozone levels and increased hospital admissions for respiratory problems. However, whether ozone exposure increases the likelihood of developing allergies in general is still open to question. Other pollutants such as sulfur dioxide, the main component of acid aerosols, and nitrogen dioxide, an indoor pollutant from gas stoves, clearly exacerbate asthma, and research suggests that education, controlling exposure to antigens in the indoor environment, and improving urban air quality are all important remedial measures.

Source: Environmental Health Perspectives, Vol.104, No.1, January 1996

Lead Poisoning in Developing Countries

In a recent editorial article for Environmental Health Perspectives [1], Dr. Jacabo Finkelman of the Panamerican Health Organization, warned that the phasing out of leaded gasoline will have only a limited public health impact in developing countries unless other sources of lead exposure are also substantially reduced.

Most acute lead poisoning cases in developing countries are associated with uncontrolled small-scale industries, in particular battery recycling. On a global scale, 63% of all processed lead is used in the manufacture of batteries since, as yet, no reliable and practical alternative technology is available. Latin American and Caribbean countries produce or recycle approximately 14% of the global output of lead, and consume some 4% of the total production. Lead mining and processing still continue to be important occupational hazards. Other main sources of exposure include the use of lead-glazed pottery, which may release significant quantities of lead into food and drink. Studies show that the consumption of food prepared or stored in lead-glazed ceramics is a significant risk factor elevating lead blood levels among consumers.

Lead-soldered side-seam cans are still widely used in Latin American and Caribbean countries, and lead residues in canned food and drink frequently exceed internationally accepted limits. Lead-based paint is used extensively throughout the region with the proportion of lead reaching 50% for exterior paint; lead pigments are also used in children's toys and pencils.

Many developing countries lack the awareness, infrastructure, and technical expertise to cope with the problem of lead exposure. Although it is important to expedite the phasing out of leaded gasoline, it is also important in the developing world to reduce and eliminate other potentially lethal sources of lead exposure.

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[1] Environmental Health Perspectives, Vol.104, No.1, January 1996.

DILEMMA IN THE USE OF PESTICIDES

The dilemma in the use of pesticides which in recent years has become a focus of public interest is that although these chemicals play a very important role in agriculture, concern for the possible threat they pose to human health has been increasing. In laboratory tests, mutagenic compounds have been found among all major categories of pesticides, including insecticides, fungicides and herbicides. A limited number of "field" studies have also been carried out aiming at the evaluation of genetic risk for the human population, and an association between occupational exposure to complexes of pesticides and presence of chromosomal aberrations and/or sister chromatid exchanges has been established in a number of cases.

A recent study into the potential clastogenic effect of pesticides conducted by researchers in the Department of General Biology of the Faculty of Medicine, Aristotelian University, Thessaloniki, Greece investigated a population composed of two groups of pesticide sprayers and a control group. These three groups comprised: a) 29 pesticides sprayers working in plastic greenhouses; b) 27 pesticides sprayers working in outdoor fields; c) 30-age and sex matched-healthy individuals living in the same area and with no history of occupational exposure to pesticides.

All three groups lived in the same geographical area located in the Ionia province of Thessaloniki. The sprayers of both groups handled various mixtures of pesticides such as organophosphoric compounds, carbamates, dithiocarbamates and organochlorine. The indoor and outdoor sprayers were exposed to the same mixture. It was not possible to attribute to single individuals an exposure to a specific pesticide or group of pesticides. All workers mixed these pesticides with bare hands and sprayed them using spraying cylinders without the use of protective clothing. Thus there was direct exposure by inhalation and by skin and eye contact.

Most of the sprayers had worked in tomato and cucumber cultivation for at least 6 years. The personal history was recorded such as smoking habits and alcohol and drug consumption.

Heparinised venous blood was obtained during the Spring season of the same year. The control samples were obtained for the same period.

An increased incidence of structural chromosomal aberrations was observed in both exposed groups a) and b), compared to control group c). It is indicated that both chromosome and chromatid-type aberrations were affected, with the most pronounced effect in acentric fragments.

As the workers of the present study were exposed to different groups of pesticides, it is difficult to determine the effect of each compound on human chromosomes.

However, while the importance of chromosomal aberrations for individuals is not yet known, exposure to carcinogenic genotoxic chemicals and induced cytogenetic damage at the group level correlates with cancer risk. Thus an increased level of chromosome breakage appears to be a relevant biomarker of future cancer risk.

The positive findings of the present work indicate the necessity of changing the present application techniques in order to reduce the exposure, as well as of improving safety and sanitary conditions in agricultural pesticide sprayers. Furthermore it is very important that surveillance be maintained for the high risk group which has an increased frequency of severe chromosomal aberrations.

Source: Carcinogenesis, Vol.17, No.1, January 1996.

ANNOUNCEMENT

Southeast Asia Training Course on Environmental Toxicology: Pollution Control and Management August 13-30, 1996 Bangkok, Thailand

The International Centre for Environmental and Industrial Toxicology (ICEIT) of the Chulabhorn Research Institute will hold this regional training course to assist developing countries in human resource development to cope with the increasing use of chemicals worldwide.

The training course consists of two parts:

* Environmental Toxicology
* Pollution Control and Management

and will be organized by ICEIT in collaboration with the Asian Institute of Technology (AIT) with the assistance of experts from leading universities/ institutes in Europe and North America as well as from international organizations.

The course will be given in English and will comprise lectures and small group discussions which will include presentations of specific environmental problems to be resolved by trainees in their group work activity.

Recommended background knowledge for the course participants is at least one of the following disciplines: chemistry, biochemistry, biology, environmental sciences, engineering or medicine.

The training program is designed for mid-level professionals.

Registration is limited. To assure a place, you should apply not later than 15 July, 1996.

Applications should be sent to:

The Secretariat
Southeast Asia Training Course on Environmental Toxicology:
Pollution Control and Management
Chulabhorn Research Institute
Vipavadee-Rangsit Highway
Bangkok 10210

Birth Defects Associated with Pesticide Exposure

A recent study conducted by the Department of Sociology, Western Michigan University reviewed the pattern of birth defects in four children associated with chlorpyrifos exposure.

All four children had ventricular, eye, and palate defects, as well as growth retardation. Three children had hydrocephaly; microcephaly; mental-retardation; blindness; hypotonia; wide-spread nipples; and deformities of the teeth, external ears, and external genitalia.

Multiple birth defects similar to those reported in these four cases occurred in a child born to a woman who was exposed to sulfur-containing organophosphate pesticides during her first trimester of pregnancy. These defects included microphthalmia, low-set ears, facial and heart defects, and cerebral atrophy. *In vitro* inhibition of brain acetylcholinesterase (AChE) was demonstrated with both a thio-containing organophosphate – as well as with a carbamate – the former evidencing a higher degree of activity in human fetal brain.

Coarctation of the aorta developed in male cousins after coincident exposure of their mothers to insect repellents, including an organophosphate pesticide.

Birth defects of the central nervous system are relatively rare, being reported in only approximately 2-4 per 1000 live births; specific defects of the eye, lip, and heart, as well as micro- and hydrocephalus, are even rarer. The fact that such a pattern of defects existed in four children, even in self-selected reports, suggests a common cause.

Source: Archives of Environmental Health, January/February 1996, Vol. 51 No. 1.

The ICEIT NEWSLETTER is published quarterly by the International Centre for Environmental and Industrial Toxicology of the Chulabhorn Research Institute. It is intended to be a source of information to create awareness of the problems caused by chemicals. However, the contents and views expressed in this newsletter do not necessarily represent the policies of ICEIT.

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